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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/830,204	04/21/2004	Brian Patterson	200310878-1	9035
22879 7590 03/24/2009 HEWLETT PACKARD COMPANY P O BOX 272400, 3404 E. HARMONY ROAD INTELLECTUAL PROPERTY ADMINISTRATION FORT COLLINS, CO 80527-2400				
EXAMINER				
TO, JENNIFER N				
ART UNIT		PAPER NUMBER		
2195				
NOTIFICATION DATE		DELIVERY MODE		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/830,204

Applicant(s)

PATTERSON ET AL.

Examiner

JENNIFER N. TO

Art Unit

2195

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SI/02)
Paper No(s)/Mail Date 04/21/2004
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. Claims 1-20 are presenting for examination.
2. The abstract of the disclosure is objected to because the content of the specification failed to disclose the technical disclosure of the patent and did not include which is new in the art to which the invention pertains. Correction is required. See MPEP § 608.01(b).
3. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). For example, claim 19 recited "usable medium", however, the specification did not provide proper antecedent basis for the recited limitation. Correction of the following is required.
4. Claims 1, 8, 19 are objected to because of the following informalities: "assign priority of tasks" should be : "assign priority to tasks". Appropriate correction is required.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claims 8-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

7. Claims 8-18 are rejected under 35 U.S.C. 101 because the claimed invention are directed to array controller, which appearing to be comprised of software alone without claiming associated computer hardware required for execution. For example, the specification paragraph [0029] suggested that the array controller as recited in claims 8, 16 is program logic which is software, and the body of the array controller comprises control logic and codes, which also are software. Software per se when claiming without any computer hardware required for execution are directed to non-statutory subject matter. Thus, claims 8 and 16 are directed to a non-statutory subject matter. Claims 9-15 and 17-18 are rejected because they are failed to cure the deficiencies from their respective parent claims.

8. As per claims 19-20, "an article of manufacture" comprising computer readable program code embedded in a controller usable medium. However, as specified in the specification, paragraph [0034], controller usable mediums could include a carrier wave signal. The program code embedded in a carrier wave signal does not produce a tangible result. Therefore, claims 19-20 are directed to non-statutory subject matter.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

10. Claim 4 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

11. As per claim 4, lines 6, 8-13, recited "measuring a current utilization value", "executing a queried task that has an assigned maximum allowable utilization value higher than the current utilization value", and "deferring to a next task on the queue, if any, for a queried task that has an assigned maximum allowable utilization value lesser than the current utilization value". However, the specification fails to describe in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. For example, let the "measuring a current utilization value" is 30%, "the maximum allowable utilization value" of the task is 75%, in this scenarios one of the ordinary skill in the art would not be able to use the claimed limitation "executing a queried task that has an assigned maximum allowable utilization value higher than the current utilization value" (i.e. the current measuring indicated that the system current utilization value is 30%, therefore, the available value that the system capable for perform the task is 70%, in that case, the system will execute the task with maximum allowable utilization value is lesser or equal to 70%, but can not execute the task with maximum allowable utilization value is higher than 70%, thus it is clearly shown that even though assigned maximum allowable utilization value higher than the current utilization value (75% higher than 30%), but the concept won't work

because the system is given of 100% to support task and it already used 30%, the availability is 70%, and the task need 75%, the system won't be able to execute the task). Also with respect to "deferring to a next task on the queue, if any, for a queried task that has an assigned maximum allowable utilization value lesser than the current utilization value", the same rational can be applied. Therefore, claim 4 is contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. For the purposed of examination, examiner will interpreted the recited limitation as "measuring a current available value", "executing a queried task that has an assigned maximum allowable utilization value higher than the current available value", and "deferring to a next task on the queue, if any, for a queried task that has an assigned maximum allowable utilization value lesser than the current available value".

12. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

13. Claims 4-6, 12-13, and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- a. The following terms lacks antecedent basis:
 - i. the individual tasks – claim 4;
 - ii. the utilization based queue -- claims 5, 12;

- b. The claim language in the following claims is not clearly understood:
 - i. as per claim 6, lines 5-7, it is not clearly understood what is meant by "maintaining a utilization task queue for queuing and executing tasks, when the high priority queue is empty, in an order based in part on the order of queuing and in part on assigned allowable utilization value of a task and a measured current utilization value".
 - ii. as per claims 13 and 17, they have the same deficiency as claim 6 above. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 7-10, 14-16, and 19-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Umberger et al (hereafter Umberger) (U.S. Publication No. 20020091746).

4. As per claim 1, Umberger teaches the invention including a method of managing task execution in a storage system (abstract) comprising:

measuring a parameter indicative of storage system workload (paragraphs [0039], [0047], [0050], [0056], ; and

assigning priority of tasks executable on the system based on the measured parameter (paragraphs [0005], [0008], [0011]-[0012], [0059]-[0063]).

5. As per claim 7, Umberger teaches maintaining a data structure associated with a utilization task queue indicative of allowable utilization of all tasks on the queue (paragraph [0039]); and executing or deferring execution of all tasks on the utilization task queue based on the data structure and a measurement of current utilization (paragraph [0040]-[0041]).

6. As per claim 8, it is rejected for the same reason as claim 1 above. In addition, Umberger teaches an array controller (fig. 1, array controller 102), a performance measurement utility (fig. 3, item 303), and a task management utility (fig. 3, item 304).

7. As per claim 9, Umberger teaches a queuing utility that maintains a task queue and processes the tasks based at least in part on a current measurement of storage array workload (paragraphs [0039]-[0040], [[0046]).

8. As per claim 10, Umberger teaches that wherein the task management utility operates in combination with the queuing utility and the performance measurement utility to maintain a queue of tasks with each task assigned a threshold utilization, periodically measure current utilization, and execute tasks on the queue in the queue

order so long as the current utilization meets the task threshold utilization (paragraphs [0039]-[0041], [0047], [0060]-[0063], [0065]-[0067]).

9. As per claim 14, it is rejected for the same reason as claim 7 above.

10. As per claim 15, Umberger teaches the storage array is a Redundant Array of Independent Disks (RAID) array in a structure selected from among RAID0, RAID1, RAID2, RAID3, RAID4, RAID5, RAID6, RAID7, and RAID10 9 (paragraphs [000069]-0076)).

11. As per claim 16, it is rejected for the same reason as claims 8 and 10 above. In addition, Umberger teaches an interface capable of coupling to a storage array (fig. 1).

12. As per claims 19-20, they are rejected for the same reason as claims 1, 8 and 10 above.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Umberger et al (hereafter Umberger) (U.S. Publication No. 20020091746).

15. As per claim 4, Umberger teaches the invention substantially as claimed in claim 1 above. In addition, Umberger teaches assigning to a task a allowable utilization value at which the task is authorized to execute (paragraphs [0062], [0065]); maintaining a queue of tasks, the individual tasks having the assigned allowable utilization values (paragraphs [0039]-[0041]); measuring a current available value (paragraphs [0047], [0049]-[0050]; querying the tasks on the queue in the queue order [paragraph [0051]; executing a queried task that has an assigned allowable utilization value higher than the current available value and deferring to a next task on the queue, if any, for a queried task that has an assigned maximum allowable utilization value lesser than the current available value (paragraphs [0051], [0059]-[0066], [0067]).

16. Umberger did not specifically teach that the allowable value assigned to the task is a maximum value.

17. However, it is would have been obvious to one of an ordinary skill in the art at the time of the invention was made to have modified the allowable value assigned to the task as taught by Umberger into a maximum allowable value assigned to the task to produce a system that capable of managing the system workload, and to handle the execution of tasks based on the capacity availability of the system in view of the a

maximum allowable value assigned to the task. Therefore, it would have been obvious to one of an ordinary skill in the art at the time the invention was made to utilize Umberger's system as modified to allocate execution of tasks based on details characteristic of a workload (Umberger, paragraph [0012]).

18. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Umberger et al (hereafter Umberger) (U.S. Publication No. 20020091746), as applied in claim 1 above, and in view of Ikeuchi et al (hereafter Ikeuchi) (U.S. Patent No. 7159071).

19. As per claim 2, Umberger teaches the invention substantially as claimed in claim 1 above. Umberger did not specifically teach counting a number of host input/output operations per unit time as the parameter indicative of workload.

20. However, Ikeuchi teach counting a number of host input/output operations per unit time as the parameter indicative of workload (col. 7, lines 35-42).

21. It would have been obvious to one of an ordinary skill in the art at the time the invention was made to combined the teaching of Umberger and Ikeuchi because both of the systems are dealing with the same field endeavor for addressing the need of managing the workload of the storage system and by incorporated the teaching of counting a number of host input/output operations per unit time as the parameter indicative of workload as suggested in Ikechi into Umberger 's system would produce a

storage system that capable of controlling the load balance of the disk in a RAID configuration (Ikeuchi, col. 2, lines 36-37).

22. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Umberger et al (hereafter Umberger) (U.S. Publication No. 20020091746), as applied in claim 1 above, and in view of Elliott, Jr et al (hereafter Elliott) (U.S. Publication No. 20040205102).

23. As per claim 2, Umberger teaches the invention substantially as claimed in claim 1 above. Umberger did not specifically teach measuring interface bandwidth as a proportion of bandwidth capacity as the parameter indicative of workload.

24. However, Elliott teaches measuring interface bandwidth as a proportion of bandwidth capacity as the parameter indicative of workload (paragraph [0057], lines 6-10).

25. It would have been obvious to one of an ordinary skill in the art at the time the invention was made to combined the teaching of Umberger and Elliott because both of the systems are dealing with the same field endeavor for addressing the need managing system network and by incorporated the teaching of measuring interface bandwidth as a proportion of bandwidth capacity as the parameter indicative of workload as suggested in Elliott into Umberger 's system would produce a system that

capable of managing the bandwidth requirement of the system (Elliott, paragraph [0001], lines 1-2).

26. Claims 5-6, 12-13 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Umberger et al (hereafter Umberger) (U.S. Publication No. 20020091746), as applied in claims 1, 8, and 16 above and in view of Courtright II et al (hereafter Courtright) (U.S. Patent No. 6157963).

27. As per claims 5-6, Umberger teaches the invention substantially as claimed in claim 1 above. Umberger did not specifically teach maintaining a plurality of task queues including a task queue that bases execution on assigned and measured utilization, at least one task queue with a priority that differs from the utilization based queue, and maintaining a high priority task queue for queuing and executing, in the queue order, tasks assigned a high priority, and maintaining a utilization task queue for queuing and executing tasks, when the high priority queue is empty, in an order based in part on the order of queuing and in part on assigned allowable utilization value of a task and a measured current utilization value.

28. However, Courtright teaches maintaining a plurality of task queues including a task queue that bases execution on assigned and measured utilization, at least one task queue with a priority that differs from the utilization based queue, and maintaining a high priority task queue for queuing and executing, in the queue order, tasks assigned a high

priority, and maintaining a utilization task queue for queuing and executing tasks, when the high priority queue is empty, in an order based in part on the order of queuing and in part on assigned allowable utilization value of a task and a measured current utilization value (fig. 3; col. 4, lines 55-67; col. 5, lines 1-43; col. 6, lines 1-67; col. 7, lines 1-63; col. 8, lines 21-62).

29. It would have been obvious to one of an ordinary skill in the art at the time the invention was made to combined the teaching of Umberger and Courtright because both of the systems are dealing with the same field endeavor for addressing the need managing I/O tasks (requests) in a storage system and by incorporated the teaching of using different queues to managing I/O tasks as suggested in Courtright into Umberger 's system would improve the integrity of Umberger's system by providing a system that scheduling I/O tasks to one or more disk drives or arrays in such a way that preventing lower priority I/O tasks are not starved of resources (Courtright, col. 1, lines 54-55; col. 2, lines 3-4).

30. As per claims 12-13, and 17, they are rejected for the same reason as claims 5-6 above.

31. Claims 11, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Umberger et al (hereafter Umberger) (U.S. Publication No. 20020091746), as applied in

claim 8, and 16 above and in view of Guha et al (hereafter Guha) (U.S. Patent No. 7152142).

32. As per claim 11, Umberger teaches the invention substantially as claimed in claim 8 above. Umberger did not specifically teach the performance measurement utility measures a performance criterion selected from among a group consisting of number of host input/output operations per unit time, interface bandwidth as a proportion of bandwidth capacity, disk busy, disk transfers per second, kbyte throughput per second, number of input/output operations per time interval, and input/output wait percentage.

33. However, Guha teaches the performance measurement utility measures a performance criterion selected from among a group consisting of number of host input/output operations per unit time, interface bandwidth as a proportion of bandwidth capacity, disk busy, disk transfers per second, kbyte throughput per second, number of input/output operations per time interval, and input/output wait percentage (col. 8, lines 45-64).

34. It would have been obvious to one of an ordinary skill in the art at the time the invention was made to combined the teaching of Umberger and Guha because both of the systems are dealing with the same field endeavor for addressing the need of managing the workload of the storage system and by incorporated the teaching that the

performance measurement utility measures a performance criterion selected from among a group consisting of number of host input/output operations per unit time, interface bandwidth as a proportion of bandwidth capacity, disk busy, disk transfers per second, kbyte throughput per second, number of input/output operations per time interval, and input/output wait percentage as suggested in Guha into Umberger 's system would improve the integrity of Umberger 's system by providing a storage controller that automatically adapts the data organization in order to satisfy different workloads (col. 3, lines 65-66).

Conclusion

35. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure (see attached PTO 892 form for details).

36. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JENNIFER N. TO whose telephone number is (571)272-7212. The examiner can normally be reached on M-T 6AM- 3:30 PM, F 6AM- 2:30 PM.

37. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

38. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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